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TESTIMONY TO THE HOUSE GOVERNMENT REFORM
SUBCOMMITTEE ON ENERGY AND RESOURCES
Realizing a Hydrogen Economy
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Mr. Chairman and Members of the Committee, I appreciate the opportunity to testify today on California's efforts to advance hydrogen as a transportation fuel. California is striving to achieve a sustainable transportation and energy future through the use of regulations, incentives and partnerships.

California considers itself a leader in realizing the first hydrogen economy and has made a commitment to building a Hydrogen Highway that will lay the foundation for 50 to 100 hydrogen stations and 2,000 hydrogen vehicle by 2010. Building a hydrogen infrastructure is a long-term strategy and an investment in California's future. We have made a first-year down payment of \$6.5 million to fund stations and vehicles. Using renewable resources is a core part of California's hydrogen future and a building block of our California Hydrogen Blueprint Plan.

We consider the Federal government to be a strong partner in developing a hydrogen economy in our State. The US DOE, EPA and DOT have actively participated in the California Fuel Cell Partnership, the California Stationary Fuel Cell Collaborative and served in prominent roles in the development of the California Hydrogen Blueprint Plan. Federal and State governments have different strengths and by combining our visions, we can create an environment that will allow free enterprise to flourish and eventually profit from clean technologies that benefit the public and the private sectors.

The Federal government has and should continue to promote research, development and demonstration (RD&D) of hydrogen technologies. Research and development, as pointed out in the March 2004 National Academies' of Science (NAS) Report, is a national priority. The report highlights several key areas where research funding should be increased, including fuel cells, hydrogen storage, distributed hydrogen infrastructure, carbon-free hydrogen (renewables and carbon capture and storage from fossil fuel technologies). Increased research funding is an absolute priority, particularly for renewable hydrogen sources and related infrastructure. However, we cannot achieve a hydrogen future by research alone, and early market deployment will be key to testing vehicles and fueling infrastructure. I have personally seen the benefit of the demonstration portion of RD&D to the development of technologies.

The NAS study is a call for government action to speed the hydrogen transition and needs to be considered in its entirety. All in all the committee is positive

about a hydrogen future and a sole focus on the cautionary provisions is short sighted. In fact, despite the challenges outlined in the Report, the Committee projects that a hydrogen future could be affordable including:

1. the fueling of a future fuel cell vehicle with hydrogen could cost no more than refueling today's gasoline cars and
2. the cost of a national hydrogen infrastructure is comparable to the cost of meeting new petroleum demand.

The US DOE should focus on and invest in California as a proving ground for hydrogen vehicles and an integrated fueling network to maximize resources and increase the rate of success.

CALIFORNIA'S DRIVE TO A SUSTAINABLE FUTURE



Committee question:
What has prompted the State to move ahead with deployment of hydrogen technologies?

Answer: Hydrogen is the only fuel that can fully address a spectrum of objectives necessary for sustainability. The objectives include a drive to achieve a zero emission transportation infrastructure, secure our energy future and bring high tech jobs to the State.

California's emphasis on hydrogen is part of a broader environmental and energy diversity program. The Zero Emission Vehicle program encompasses super clean cars, hybrids, battery electric vehicles, fuel cell electric vehicles, and alternative fuels. The Air Resources Board has adopted regulations that call for the reduction of greenhouse gas emissions from automobiles and light duty trucks. Such a portfolio of strategies is necessary to cover the near, medium and long term objectives of our State.

Although air quality in California has significantly improved over the past 50 years, it remains the nation's smoggiest state. Air monitoring records show that more than 90 percent of Californians breathe unhealthy levels of air pollution at some time during the year. Health studies show that one in seven children ages 6 through 17 in the state have been diagnosed with asthma. In 2003 more than 60 percent of the state's air pollution came from mobile sources such as cars and trucks that rely on gasoline and diesel fuels.

The burning of these fossil fuels produces pollution that not only damages human health but also generates greenhouse gases that contribute to the unsustainable climate change of the planet. In addition to air quality problems, the world is running out of easily accessible petroleum and almost 60 percent of the petroleum imported into the United States is from geopolitically unstable areas of the world.

California continues to tackle these challenges. To date, we have had one of the most successful "command and control" environmental protection programs in the world, and we persist in setting and meeting aggressive performance standards for emissions from new engines.

While this approach has been successful and needs to be continued, California must also look to the future in order to realize our health based air quality goals. And a fundamental strategy includes pursuing hydrogen as a transportation fuel.

| Moving toward a hydrogen economy in California offers the possibility of energy independence and clean, sustainable transportation. Hydrogen when used to power vehicles produces very low levels of environmental impact. It can be produced through a variety of processes using a range of feedstocks, including natural gas, methanol, ethanol, biomass, and water. As an emerging transportation fuel, the promise of hydrogen is driving innovative design of high-efficiency vehicles that offer important energy diversification and environmental benefits.

**The overwhelming majority of
Californians support
Governor Schwarzenegger's
greenhouse gas emissions targets,
hydrogen highway network,
and
million solar roofs initiative.**

Source: PPIC Special Survey on the Environment.

THE CALIFORNIA HYDROGEN HIGHWAY NETWORK



On April 20, 2004, Governor Arnold Schwarzenegger signed Executive Order S-7-04 calling for the development of the California

Hydrogen Blueprint Plan (Blueprint Plan). On that same day, the Governor designated the University of California, Davis' hydrogen fueling station as "Station #1" of the California Hydrogen Highway Network.

Committee question: *What concrete steps has California taken to realize a hydrogen economy?*

Answer:

- **Launched a State initiative to link hydrogen demonstration stations to create a third-party accessible, hydrogen fueling network**
- **Engaged over 200 volunteer experts to develop the California Hydrogen Blueprint Plan**
- **Adopted the California Hydrogen Blueprint Plan and its goals as California's hydrogen policy document**
- **Committed \$6.5 million in California's 2005-06 budget for hydrogen technologies**

In the months that followed, more than 200 volunteer experts engaged in the development of the Blueprint Plan. These volunteers represented a wide array of government agencies, private industry, academia, and environmental organizations. Each individual served on one of five separate "Topic Teams" which included Rollout Strategy, Societal Benefits, Economy, Implementation, and Public Education. Each team submitted an independent report; and the two-volume Blueprint Plan was compiled by an Executive Team. All members were motivated by a shared set of core values that defined the vision of a sustainable hydrogen economy for California, namely energy security, national security, a healthy environment, and economic growth and opportunity for California. The final report and recommendations were adopted by the Governor in May 2005.

The Blueprint Plan recommends a three-phased implementation strategy for establishing a hydrogen fueling infrastructure. Specific milestones include the introduction of 50 to 100 fueling stations, 2,000 hydrogen-fueled passenger cars and light-duty trucks, 10 heavy-duty hydrogen-powered vehicles, and 5 stationary or off-road fuel cell applications by 2010. Later phases include goals of 250 stations and up to 20,000 light-duty vehicles available for sale in the state. Similar accelerated objectives have been recommended for heavy-duty vehicles, stationary applications, and off-road vehicles.

Type of Hydrogen-Fueled Vehicle or Product	Number of Units Targeted / Estimated for Deployment (by Phase)		
	Phase 1: 50 to 100 Stations	Phase 2: 250 Stations	Phase 3: 250 Stations
Light-duty vehicles	2,000	10,000	20,000
Heavy-duty vehicles	10	100	300
Stationary and off-road vehicle applications.	5	60	400

The Blueprint Plan also recommends that the vehicles and stations contribute significantly to environmental benefits, specifically that they realize a 20 percent renewable energy goal for hydrogen production (in excess of the state's 20 percent Renewables Portfolio Standard goal) and a 30 percent reduction in greenhouse gas emissions.

Central to the achievement of the Blueprint Plan's goals is a siting strategy for hydrogen fueling stations. The stations currently operating in California have been placed for demonstration or research purposes such as those located at University of California sites or at the California Fuel Cell Partnership facility in West Sacramento. To ensure maximum use of future stations, it is essential that their placement be matched with the highest concentrations of vehicles. Initially, it is likely that these vehicles will be placed in fleets. The recommended approach is to build up a system of stations concentrated in California's main metropolitan areas such as Los Angeles, Sacramento, San Diego, and San Francisco. Under this scenario, auto manufacturers will be able to demonstrate the full viability of hydrogen technology and increase opportunities for Californians to choose to drive hydrogen vehicles and be able to refuel conveniently.

As we all know, achieving these goals will require funding from multiple sources. The most effective scheme will see the creation of public-private partnerships, industry collaborating with government. There is already considerable investment in California's hydrogen infrastructure—the first 39 stations are already being funded through existing partnerships such as those associated with the United States Department of Energy, the South Coast Air Quality Management District and the members of the California Fuel Cell Partnership.

Governor Schwarzenegger and the California Legislature have allocated \$6.5 million in California's 2005-06 budget for government investment in up to 3 fueling stations, leases of 12 hydrogen vehicles for the state's fleet, and purchase of 2 hydrogen internal combustion engine shuttle buses to be used at a university or airport. All of these projects must meet energy and environmental goals that are more challenging than those recommended in the Blueprint Plan: 1) a 30% reduction in greenhouse gas emissions relative to today's infrastructure and 2) 33% of the hydrogen must be generated from renewable resources. In addition, the Cal/EPA Environmental Justice Committee will meet to discuss siting criteria for the hydrogen stations.

**Number of people working in
CA's renewables sector:
170,000**
**Amount of venture capital
invested in clean technology
in CA in 2003:
\$339 million**

Source: Low Carbon Leader:
California June. 2005

But additional activities are needed that can only be achieved through partnering—particularly research, development and demonstrations that combine the efforts of the United States' and California's governments.

PARTNERING FOR SUCCESS: THE U.S. GOVERNMENT AND CALIFORNIA

Committee question: *To what extent has the Department of Energy helped or hindered the State's program?*

Answer:
California's hydrogen initiatives have positively benefited from the US DOE's RD&D program investments that were competitively bid and are congruent with the DOE national program.



LAX Hydrogen Station 1

The US DOE has significantly contributed to the success of California's efforts to build the first network of stations. DOE has indicated to me that \$18 million of their 2004 budget and \$25 million in their 2005 budget supports research, development and demonstration projects in California. In addition, DOE has offered their expertise in codes and standards, safety, communications, education, and energy efficiency and environmental benefits modeling. These contributions have been through working directly with State agencies, and via California research programs and National Universities located in California.

California is committed to working with our stakeholders and the Federal government to advance the development and acceptance of hydrogen technologies. Our commitment is in the form of regulations, incentives, policy introduction, demonstration coordination and communications. I believe California has the most forward looking and progressive hydrogen activities in the world because of stakeholder and Federal government investment, our experience with alternative fuels and our focus on environmentally sensitive technologies.

MOVING FORWARD—RECOMMENDATIONS

Committee question: *What more could the Federal government do to support state initiatives like California's in realizing the hydrogen economy?*

Answer:

1. fully fund the 2005 Energy Policy Act and provide tax credits for hydrogen based infrastructure projects
2. work more closely with California in developing an integrated network of third-party accessible stations
3. level the playing field in competing for federal funds
4. fully fund programs that advance renewable technologies

1. Governor Schwarzenegger and I support the federal commitment to hydrogen technology in the 2005 Energy Policy Act. In addition, we hope the Conference Committee will include a tax credit for hydrogen-based infrastructure projects in the final legislation.
2. I suggest that the DOE and recipients of DOE hydrogen station awards work closely with my staff to build up the *network* of stations rather than continue to place stations that are only available to an isolated fleet of vehicles. The Federal government's investment in California hydrogen stations advances a hydrogen economy but does not always expand the California Hydrogen Highway Network because not all of the stations are third-party accessible. The legal and safety

issues associated with third-party access need to be addressed if we are going to take our understanding of hydrogen commercialization to the next level.

3. The US DOE has laid out a program that is balanced and appropriate for the US. However, I have been discouraged that the *Hydrogen Vehicle Technology Demonstration and Validation Project* that is so important to California has been slowed down due to the proliferation of earmarks. The increased number of earmarks has changed the entire landscape of the process to compete and win DOE funding. Many stakeholders have expressed their frustration in competing for DOE awards when other competitors by-pass the usual process with earmarks awards. I do not believe the earmarks are in the overall best interest of DOE's programmatic goals or our country.
4. I encourage Congress to fully fund programs that develop renewable technologies because a sustainable hydrogen economy is based on renewably produced hydrogen.

Conclusion

Mr. Chairman and members of the Committee, California is committed to implementing Governor Schwarzenegger's Hydrogen Highway Network which is consistent with President Bush's vision of hydrogen as a long term strategy for the U.S.

Let me assure the Committee that California is serious about our commitment to realizing a hydrogen economy. We have taken the first important steps in building the California Hydrogen Highway Network and believe the time is right for the U.S hydrogen infrastructure to take root.

The challenges associated with implementing a hydrogen economy are significant but we cannot ignore the challenges associated with our present dependence on fossil fuel. The price of oil continues to rise and the competition for fossil fuel resources will only grow if China's economy develops on the same pathway that the US adopted. Not only is our energy security and position of prominence within the world economy at risk but so is the health of our citizens. Our inefficient fossil fuel dependence creates an unhealthy environment by poisoning our air, water and land. California is committed to addressing public health goals including urban air pollution and global climate change. We think hydrogen can address our environmental and energy security concerns.

We have an opportunity to leave our children with a safer way of life that doesn't include the worries associated with dependence on other countries for our energy supply. For all of the aforementioned reasons, I believe the challenges on the pathway to a hydrogen economy must be overcome.

I appreciate the invitation to speak to you today and look forward to continuing this dialogue in the future.